*Forecasting the weather
- ensemble techniques
in probabilistic weather prediction*

CECILIA climate simulations - validation and analysis of climate change signal

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In the frame of the EC FP6 project CECILIA several regional climate model (RCM) simulations were performed in very high resolution of 10 km to capture the possible evolution of climate conditions in Central and Eastern Europe (CEE).

CECILIA project's modeling system consists of six individual climate simulations performed by three regional climate models (ALADIN-Climate/CZ, ALADIN-Climate and RegCM3) over various domains in the target CEE region. The RCM experiments included two simulations for recent past period 1961-1990, when RCMs were driven by either the ERA-40 re-analysis or a global circulation model (ARPEGE-Climate or ECHAM5), and two global circulation model driven experiments under the IPCC SRES A1B scenario conditions for future periods of 2021-2050 and 2071-2100.

Here we present the initial validation of CECILIA RCMs in the ERA-40 experiments focusing on individual territories of CEE countries and detection of climate response over the area composed from RCM domains in the CEE region. Seasonal values of air temperature and precipitation are investigated in both cases.

Validation against the E-OBS v2 dataset of gridded station observations reveals the dominating negative biases of air temperature and precipitation. Spatial variability and correlation of air temperature fields are well captured. Precipitation field shows increased spatial variability, especially over region with complex topography, and decreased spatial correlations. The inter-annual variability of both, air temperature and precipitation is overall well corresponding to observations. The detected weaknesses found within the validation process are mostly attributed to lower robustness of the set of physical parameterizations in models, integration domain setting and imperfections in the E-OBS dataset for comparison with models of higher resolution.

Climate change signal is analyzed for two RCM families (ALADIN and RegCM3) independently. Both RCM families show the same general features: warming between 0 to 3ºC in near future (2021-2050) and 2-5ºC in far future (2071-2100) with least warming in north-western part of the domain increasing in the south-eastern direction. The seasonal values are more varied between model sets, with RegCM3 having more consistent results with its forcing model. Projected precipitation evolution is less definite, indicating rather small seasonal changes varying among RCM families and seasons and overall being compensated in annual terms. There is an increase in inter-annual variability of precipitation in near and far future.